

## Electrochemically Prepared Hydrous Ruthenium Oxide on Carbon Nanotube (CNT) Substrate for Supercapacitor Application

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Electrochemical capacitors (EC) using double layer capacitance and pseudocapacitance is called electrochemical double layer capacitor (EDLC) and supercapacitor (or pseudocapacitor), respectively. Transition metal oxides are considered the best candidates for high energy density electrode materials for supercapacitors. Among transition metal oxides, ruthenium oxide has been the most promising electrode material due to its high specific capacitance, long cycle life, high conductivity, and good electrochemical reversibility as well as high power density.<sup>3-6</sup> High specific capacitance of ruthenium oxide comes from the faradaic reaction between ruthenium oxide and H ions in acidic electrolyte.

In this study, carbon nanotube (CNT) thin film substrates are prepared by electrostatic spray deposition (ESD) technique. Hydrous ruthenium oxide is electrochemically prepared on CNT substrate using potential cycling method. Formation of ruthenium oxide and its redox behavior during potential cycling is studied using an electrochemical quartz crystal microbalance (EQCM). The electrochemical properties such as specific capacitance, reversibility, and high rate capability of electrochemically prepared hydrous ruthenium oxide on CNT substrate are also studied.

### References

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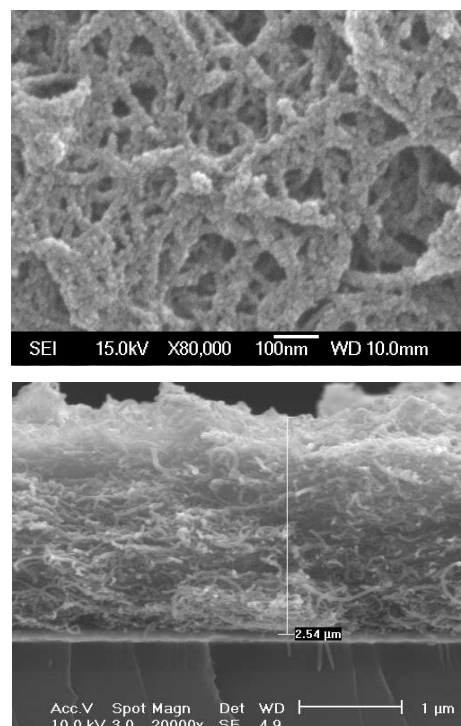


Figure 1. SEM of electrochemically prepared hydrous ruthenium oxide on CNT thin film substrate.

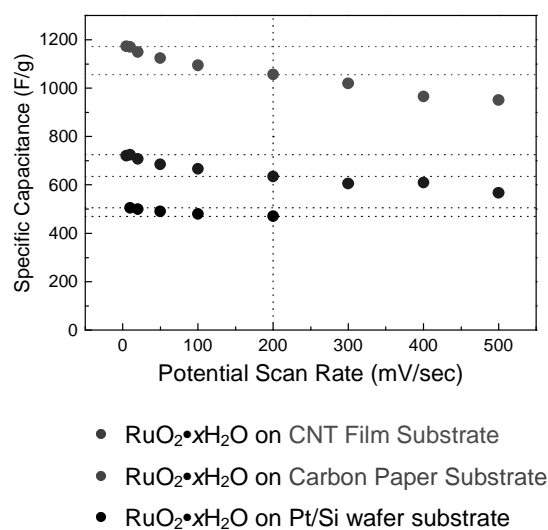


Figure 2. Specific capacitance of electrochemically prepared hydrous ruthenium oxide with various substrates.